

Hall C User Howto

Experiment: HKS

Design of HKS Sieve Slit/Collimator

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Abstract

This Howto outlines the purpose of the HKS Sieve Slit/Collimator, its design parameters.

1 Purpose

The sieve slit is a collimator plate with array of holes that select events with specific angles. With a point target and recognition of the correlations of the focal plane parameters, these events separated into specific holes are used to optimize the angular reconstruction matrices.

On the same plate, an open collimator is made to basically match the HKS spectrometer acceptances in order to minimize the particles that may hit the irons inside the spectrometer.

There is also an un-collimated opening on the plate. This is an option in case a study of the blocking effect of particles.

2 Design

The Kaon arm is formed by Splitter dipole which separates the scattered Kaons from oppositely recoil electrons followed the HKS spectrometer, the plate is attached with the exit of the Splitter magnet. The plate is placed at

20 cm upstream from Q1 entrance (85 cm downstream from virtual source point of the HKS). The plate has a thickness of 5.08 cm.

Since the plate is located inside of the overall optics with Splitter field in front of it, slight momentum dependence in the events selected from each hole appears. Thus the optimization procedure and method for the angular matrix are different from those used for the SOS and HMS spectrometers. Calibration method and procedure will be described in separate Howto.

The shape of the collimator is symmetric in Y but not symmetric in X. The opening angle is 25 msr. The sieve slit hole pattern is not symmetric in X and Y. There are 11 columns (x) and 7 rows (y). The spacing between two holes is 0.6" in the horizontal and 0.8" in the vertical. Diameter of the holes are 0.25" except for the center one with a 0.125" diameter. Holes are not flared, but are not perpendicular to the slit plate in order to match the angle of the hole for particle trajectory.

The hole size is to ensure the angular reconstruction accuracy better than 2 mr in σ under the given focal plate angular measurement accuracy and at same time to obtain sufficient event rate.